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BRANCH OF RESEARCH

MONTHLY REPORT

OF

DENDROLOGY
FOREST EXPERIMENT STATIONS
GRAZING RESEARCH
FOREST PRODUCTS
FOREST ECONOMICS

October, 1927.

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BRANCH OF RESEARCH

October, 1927

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FOREWORD

(From "Crop-production in India, 1924" by Albert Howard)

THE IDEAL INVESTIGATOR

What kind of investigators are needed for agricultural work, and what can be done in India to fit them for their task? It is now proposed to answer these two questions in so far as they relate to crop-problems.

What is the essential nature of a crop? It can be regarded as a group of living factories which utilize two classes of raw material: the one obtained from the soil, the other from the atmosphere. Various mineral salts, in dilute solution, enter the plant from the soil by way of the root-system and are carried to the green leaves by the upward transpiration current. From the atmosphere, oxygen and carbon dioxide reach the same point by way of the stomata. In the green cells of the leaf, these two classes of raw materials are worked up into complex food substances by means of energy focussed from the sun through the medium of the chlorophyll corpuscles. Unlike an animal, a plant has to make its own food before it can feed. In both cases, the actual food, however, is very similar. The crop is constantly manufacturing food, developing new organs, and completing its life cycle under varying conditions as regards the supply of raw materials, temperature, illumination, and humidity. The manufacture of its own food by the green leaves is the first work of the plant. Its second duty is to provide a surplus—in the shape of reserve materials which are often packed into the seed—for the use of the next generation. Man intercepts these reserve materials for his own use, and on their amount and quality the success or failure of crop-production depends. In this manufacture of food, it is well to bear in mind the fact that the plant has always to feed itself first of all and that the formation of reserves marks as it were a second stage of activity. Naturally, the greater the efficiency of the factory, the more food there will be for the growth and the greater will be the volume of the reserves. The duty of the investigator of crop-problems is to study the working and output of this natural factory, to discover the directions in which it can be improved, and then to devise the most economical method of carrying this out. Often improvements are possible but they are not economic. The trouble and cost involved are prohibitive.

(Over)

Such discoveries, therefore, are only of academic interest and cannot affect practice. To be successful, the game must always be worth the candle. In India, the cultivators are mostly in debt and the holdings are small. Any capital required for developments has to be borrowed. A large number of possible improvements are barred by the fact that the extra return is not large enough to pay the high interest on the capital involved and also to yield a profit to the cultivator. It is this economic complication which makes it so difficult to improve production in India.

The knowledge required by the investigator of crop-problems must obviously be considerable. On the scientific side, he must be well trained in all branches of botanical science, including morphology, anatomy, physiology, pathology, systematic botany, ecology, and genetics. In addition, he must have a sound knowledge of general science, in which chemistry and physics should be included. Such knowledge is essential because in crop-problems, it is not the plant alone that has to be studied but the plant in relation to its environment. This part of the training of the future investigator is the work of the University, and is best obtained in the science schools. One drawback of even the best scientific training has, however, to be borne in mind in the training of investigators, namely, the artificial sub-division of science rendered necessary by the exigencies of teaching and examinations. The advanced student should be made to realize that such sub-division, and the consequent existence of schools of botany, chemistry, physics, and so on, is after all an artificial thing which is not recognized by the living plant. The investigator of crop-problems should disabuse his mind of the compartment system necessary for the teaching of science, and not allow it to invade the second stage of his training — the experiment station phase. In agriculture, the work of the plant forms a definite branch of the subject and has no separate existence in terms of botany, chemistry, or physics. This is a most important matter because among scientific workers there is always the temptation for the disciples of each school to separate into something approaching a faction. Unfortunately, these academic conventions, which really belong to the teaching of science, have affected agricultural research and have tended to limit unduly the scope of much of the work which has been done on crops. This narrow outlook is, however, slowly breaking down, and crop-production, rather than one or other of the sub-divisions of agricultural science, is coming to be regarded as the real subject of study.

After an adequate scientific training, the future investigator of crop-problems must master the art of agriculture as far as it relates to crops, and also pay attention to a number of trade aspects. Here again, anything in the nature of separate compartments must be avoided. The art of agriculture, which is nothing more than the crystallized experience of generations of tillers of the soil, must be simultaneously looked at from the point of view of the cultivator and of the student of science. In ancient systems of agriculture, such as that of India, it must never be forgotten that the cultivator is generally sound in his procedure; the difficulty often is to perceive the scientific basis of his practice. Similarly, in studying the trade aspects of crop-production, these must be welded into the scheme of things and not regarded as a separate subject. If the investigator is to use his science as an instrument for improving production, it is clear that he must consider all aspects of a crop like cotton from the moment the seed begins to germinate in the moist soil till the fibre is worked up in a factory into some material for the use of mankind.

Such is the training and experience needed on the part of the worker. It is obviously considerable. The University phase is the beginning and constitutes the period of acquisition, something like the caterpillar stage in the life-history of a butterfly. After this, practical experience is essential, and the future investigator must be at great pains to weld the two stages of his training into a well-balanced whole. Such a training, as has been indicated, must be expensive both as regards money and time, and any State organization which employs such men cannot possibly afford large numbers.

In India, experience has shown that two difficulties will have to be overcome in the training of investigators. The first occurs in the University phase, the second in the apprenticeship stage. Both these difficulties often arise from economic causes.

In the University period, many students show a marked tendency to rush into agricultural and other technical work before they have acquired a sufficiently advanced knowledge of the science they wish to make use of in later life. This leads to disappointment when the time comes to take up independent investigation. Sometimes an effort is made to repair the want of preliminary training by short periods of work in European and American Universities, but the youthful period of easy acquisition has been passed, and the results are frequently disappointing. The diffi-

culty can only be overcome by continuing to raise the standard of science teaching, and by impressing on the students that the first requisite in the investigation of subjects like crop-production is adequate scientific knowledge, and that this can only be acquired during the student phase. It is too late afterwards.

The apprenticeshipphase—between the University period and the actual work of research— is at present very defective. Sometimes this stage is omitted altogether and the University graduate takes up research work on all manner of applied subjects on leaving College. As a result, the subject suffers from the publication of obviously immature work. What is now required in matters concerning crop-production is the institution of a definite apprenticeship phase at the experiment stations. Here the young University graduate can study the art of agriculture, master the technical details of the work of investigation, and begin research in collaboration with men of experience. It is, however, very difficult, for economic reasons, for the average student to give the time required. This obstacle can be removed by the liberal provision of postgraduate studentships. A beginning has been made in this direction. A number of research studentships have been founded to enable selected graduates of Indian universities to spend two years at approved experiment stations, where they can serve an apprenticeship in research work under investigators of experience.

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FOREST EXPERIMENT STATIONS

Washington

General

Practically all roads led to Washington during October, as far as Research was concerned. Messrs., Clapp, Munns, Chapline, and Reineke returned after an absence of several months. Munns, however, left again in a few days for the Southern Station to attend the Advisory Council meeting, and to make a short inspection trip of the field work in the South and to visit the Appalachian Station.

The flood control work to which Mr. L. F. Kellogg has been assigned since his reinstatement in the Service in July, and in connection with which he has rendered very effective service, has now been completed. After finishing up odd jobs in the way of collecting compilation material, photographs, slides, etc., Mr. Kellogg will leave for Columbus to join the staff of the Central States Station.

The reprint of "Forests and Water" appeared during the month, and 150,000 postcards announcing the publication are being distributed by many different agencies.

After more than 25 years of service, Miss Elsie B. Stabler, of the Section of Forest Measurements, has been placed on the retired list on account of disability. Miss Stabler had not been in good health for some time, and realizing that her health was affecting her work, she finally asked to be allowed to resign. However, considering her many years of faithful work and loyalty to the Forest Service, she has not been permitted to drop out of the picture by resigning, but instead has been placed on the retired list. It is hoped that after a long rest in which to build up her health, Miss Stabler will have many useful, happy years ahead of her.

After a tour of the United States during which he visited many forest experiment stations, Dr. Irjo Ilvessalo, of Finland, returned to Washington and spent some little time in the office, particularly the photographic collection and the library.

Library

Last month there were 943 books and periodicals loaned from the library, and 148 members of the Service and others consulted the library in person.

The number of books and articles indexed for the catalogue last month was 312.

Resolution of the New England Section of the Society of American Foresters September 8, 1927, at Waterville, N. H.

In view of the numerous problems in silviculture, forest entomology, pathology and other sciences underlying the practice of forestry which require careful investigation by thoroughly trained experts, and in view of the present inadequate financial support of the various forest experiment stations, we urge upon Congress the need of further provision for existing stations rather than the dissipation of funds for the multiplication of stations and we also believe that these stations should be supported by one general appropriation, thus eliminating pork barrel politics.

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NORTHEASTERN FOREST EXPERIMENT STATION

In addition to spending considerable time on the permanent sample plots at Corbin Park and Cherry Mountain in New Hampshire, Westveld and his party remeasured the plots established some 20 years ago by the Forest Service on the Waterville tract of about 22,000 acres, located in the White Mountain National Forest. These plots had been cut to a diameter limit of approximately 12 inches, but the increment on the residual coniferous stand, plus advance reproduction, was more than offset by the heavy mortality resulting from windthrow during the 20-year period following cutting. The New England Section of the Society of American Foresters, which met at Waterville September 6-8, spent an interesting afternoon examining these plots.

On his tour of New England the latter part of August and early in September, Doctor Hesselman made a special trip to the Cherry Mountain experimental area in the White Mountain National Forest, where much of the Station's work in the spruce types is concentrated. Here Doctor Hesselman had a splendid opportunity

to study podsolized soils which are so common in the spruce region. He was particularly enthusiastic about the excellent condition of our soils as compared to conditions in Sweden. In that country fire is frequently used to destroy the raw humus which accumulates to such depths as to prevent the establishment of reproduction; whereas our humus soils, where they do appear, decompose fairly rapidly following the removal of the mature stand. In Doctor Hesselman's opinion the dense growth of raspberry which usually follows cutting on spruce flats is an indication of favorable nitrification conditions.

The State of Vermont cooperated with the Station in the establishment of a large number of permanent sample plots in that state. With the exception of three slash disposal plots which were established in old spruce in the Plainfield State Forest, the work was all done on the Middlebury College Forest of some 30,000 acres, donated by Colonel Battell to the College some years ago. Five plots were established in even-aged, understocked stands of pasture spruce to determine their rate of growth and their progress toward normality; three weeding plots on 4-year-old cuttings in a mixed spruce and hardwood type, where such weed species as fire cherry, mountain and striped maple were cut back to favor the more valuable spruce, yellow birch, and hard maple; two methods of cutting plots, one of which was clear cut, while on the other wolf trees and unmerchantable hardwoods were left to determine their effect on the development of the new stand.

Stickel presented a progress report on the fire weather studies carried on at Elk Lake in the Adirondacks this summer at the annual meeting of the Empire State Forest Products Association held at the New York State College of Forestry, Syracuse, October 6. A preliminary analysis of the data of this station shows that for the upper red spruce slope type the danger point is reached when the duff moisture falls below 15 per cent.

The fire weather studies have been discontinued in Maine and New York, but the Harvard Forest Station will be continued as long as weather conditions permit.

Gast has spent most of his time on the electrical capacity method of determining moisture, a study in which the General Radio Company of Cambridge, Massachusetts, cooperated in the orientation experiments. It is hoped that further work will substantiate the preliminary studies, which indicate that electrical capacity may be of use in the measurement of duff moisture and soil moisture in much the same way as Tuttle, at the Madison Laboratory, used it for the determination of moisture in wood.

Spaulding has spent most of the last two months investigating the European larch canker, with the assistance of several men from the Bureau of Plant Industry. A special effort is being made to learn the hosts of this fungus, both the American and European strains, and its distribution on introduced as well as native larch. It appears to be generally distributed on the native larch.

An interesting visitor of the month was Doctor H. F. von-Maltzahn from Mecklenberg, Germany, who is carrying on some special work in this country with headquarters at New Haven.

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CENTRAL STATES FOREST EXPERIMENT STATION

General

McCarthy and Meyer attended the meeting of the Ohio Valley Section of the Society of American Foresters in Indiana during the second week in October. This was a field meeting, and a well organized trip through the southern end of Indiana furnished an opportunity to become acquainted with forest conditions in this part of the state. Following the examination of a series of woodlots and plantations a visit was made to the Clark County State Forest, comprising about 4500 acres and lying just outside of Henryville. Here the Indiana state forest service, under the direction of Mr. Deam, has initiated a considerable number of experiments both in plantations and in improvement of existing second growth. In view of the fact that heavy cutting of the old growth forest about 35 or 40 years ago resulted in excellent second growth, these cleaning experiments may be expected to furnish results in a short period of years.

On the Clark County State Forest, softwood plantations are generally more successful than hardwood plantations. Yellow poplar has proved itself to be one of the most suitable hardwoods. Black locust has been used in plantations in the belief that it improves the growth quality because of its nitrogen storing qualities. While this subject has been treated experimentally, the Indiana foresters are confident positive results have been obtained which show the beneficial influence of locust in plantations. Another interesting fact noted was the scarring of yellow poplar saplings due to sun scald. These scars occurred on the south side of the tree where it was planted on a southerly slope. The explanation made was that the killing of the cambium was due to drying when the ground was frozen. The scars might easily have passed for fire scars.

Since this Section contained representatives of the states of Ohio, Indiana, Illinois, Missouri, and Michigan, a research committee was appointed by the chairman to summarize the investigative work completed or projected by institutions engaged in forest research.

McCarthy attended the regional conference on State Parks held in Cincinnati. Among other topics of interest was a report on park developments in Indiana, Ohio, and Kentucky. Interest was especially aroused over the possible loss of Cumberland Falls in Kentucky due to a water-power development. The property is now under option. Mr. Lieber, conservation commissioner of Indiana, asked McCarthy to outline the work of the new Central States Forest Experiment Station. The opportunity was used to familiarize the park representatives assembled with the nature of the work the Station will undertake. The next meeting of this park conference will be just outside Wheeling, W. Va.

Day, who attended the fall meeting of the American Society of Civil Engineers at Columbus on October 12th and 13th, reported: "At this meeting the water-ways division held a very interesting symposium on 'Flood control with reference to the Mississippi River.' It was quite obvious from the remarks of the speakers and comments of members that a misconception exists as to the relative importance of forest cover in flood control. McCarthy's discussion, 'Forest Cover as a Factor in Flood Control,' was well received and is believed to have had a favorable effect in clarifying the stand of foresters on this subject. Nathan C. Grover of the United States Geological Survey and Col. William B. Wooten both gave favorable consideration to the possibilities of reforestation. Col. Wooten suggested the possibility of acquisition of large tracts in the lower delta which would serve as natural spillways; these lands to be held in government or state ownership and maintained in forest cover, the theory being that a forest crop would not be seriously damaged by the occasional use of the land as a spillway."

Oak Study

The excellent weather through October allowed continuation of field work. Morey returned to Columbus late in the month after he had covered the south central section of Pennsylvania and parts of Maryland in company with Wood and Hough. On his way to Columbus he stopped at Morgantown, W. Va., and went with extension forester Skuce into the territory south and west of Elkins, where he found a considerable amount of second growth oak.

Hanley, Hills, and Bower finished the search for plots in south-central Ohio. An opportunity was presented through the operations of several portable mills to secure additional stem measurements of oaks for volume tables. This work was then carried on by Day and Bower while Hanley and Hills extended the search for second growth stands into the lower Cumberland of Tennessee and Kentucky. Thus far all of the best second growth oak stands have been found on land previously cut over for the production of charcoal. Reference to the location of these furnace areas was secured from the Iron Manufacturers' Guide.

The data thus far accumulated in the oak study were forwarded from the Appalachian Station where the great bulk of this material has been collected during the past two years. Several of the volume tables are practically completed and it is planned to assign to the oak study all of the staff of this Station not otherwise engaged during the winter season in the hope of completing this study by the beginning of the next field season.

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LAKE STATES FOREST EXPERIMENT STATION

Preparation for the annual meeting of the Advisory Committee to the Station, which will be held November 9, at Madison, Wisconsin, required considerable thought and attention. The plan is to have the meeting of the Committee itself during the day when affairs concerning this Station in particular will be discussed. At a dinner and in the evening not only the Committee but many others interested in conservation in the region have been invited. About 110 invitations were sent out. The speakers in the evening will include the Governor of Wisconsin, the new Director of Conservation, Colonel Greeley, Senator Blanchard, State Secretary of Agriculture, and others who will discuss Wisconsin Forest Problems. In this way the meeting will fulfill an important need in guiding and coordinating the ripening interest in conservation in Wisconsin just at the time when the new Director of Conservation is getting started.

Another interesting development in Wisconsin is the initiation of a short course at the College of Agriculture at Madison for logging superintendents and woods men. The Director has taken an active part in planning this course and is going to take part in conducting the meetings. Ten or more men of logging

superintendent type have already registered for the course. It will include one week's instruction at Madison, followed by several days in the woods where particular attention will be given to going operations in selective logging. The aim has been, and it promises to be fulfilled, to put forestry into the woods through the medium of the men who are actually running the woods operations.

The supply of 4,500 copies of the pamphlet "Selective Logging in the Northern Hardwoods of the Lake States with Special Reference to the Cost of Handling Small and Large Trees," was received, and most of them have already been distributed.

The establishment of the two sets of thinning plots on the Minnesota National Forest was completed by Averell about the middle of the month, and the soil samples from these and from the other plots on that Forest were collected so that the soils will be available for growth tests in the greenhouse at University Farm this winter. After two days in the office, Averell went on to the Substation at Ruse.

The annual accumulation of leaf litter on the burlap strips under stands of Norway and jack pine on the Minnesota National Forest were also collected and sent to the Station.

Mr. Clapp spent two days at the Station chiefly in the discussion of the work and plans for the future. Other visitors included Mr. Nagler, new Director of the Department of Conservation in Wisconsin; Mr. Aberg of the Izaak Walton League, of Wisconsin; and Professor Fritz of the California School of Forestry. Bruce and Stevens visited the Station during the month, particularly in connection with information on planting which might be applicable to the cut-over hardwood lands of one large company in northeastern Wisconsin. This company is planning to try out selective logging on a large scale and is also starting on a planting program.

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APPALACHIAN FOREST EXPERIMENT STATION

General

The Appalachian Forest Research Council met at Asheville October 17. Fourteen members of the Council and thirteen guests were present. Shortly before the meeting a memorandum was issued to the Council members outlining the Station's investigative problems and suggesting some possible subjects for next year's program and for later study. This memorandum prepared the ground for the discussion, which followed seven subjects contained in the program for the meeting: (1) role of forests and forest management in flood and erosion control; (2) relation of forest management to game and wild life; (3) next year's program for the Station: should increased emphasis be placed upon intensive investigations? (4) investigations in forest entomology; (5) forest pathological studies; (6) the situation as to logging and mill scale studies; (7) nation-wide movements in forest research. Each of these subjects was discussed at some length.

A resolution was adopted recommending, as new major projects for the Station, studies of the growth of irregular and understocked stands, and of conditions limiting forest types; and as new projects, studies of fire damage to forest soils, of seed production and germination of important hardwoods, of methods of eradicating underbrush prejudicial to reproduction, and of methods of slash disposal. Other resolutions advocated a logging and mill scale study and the assignment to the Appalachian region of a specialist in wood utilization and of another in the management of game and wild life. The Council strongly recommended to Congress that steps be taken to solve the problems of the relation of forests to flood control and the silting of reservoirs. It also endorsed legislation, similar to the McSweeney bill, for forest research; and affirmed its belief that a fully equipped and financed school of forestry is needed in the South, and that such a school would greatly advance the forestry movement in the South and would receive the hearty cooperation of the federal and state forestry agencies.

Two of last springs series of radio talks from WWNC, Asheville, were mimeographed and distributed to the Station's mailing list. The titles of these were "Insect Enemies of Forest Trees," by J. A. Beal, and "The Pulp and Paper Industry in Relation to Forestry," by W. J. Damtoft, forester for the Champion Fibre Company, of Canton, N. C. These radio talks were given under the auspices of the Southern Appalachian Section of the Society of American Foresters.

District Forester Evan W. Kelley visited the Station and discussed with Frothingham some of the District's problems and plans relating to research. Another visitor was Karl A. Swenning, forester for the Mead Pulp and Paper Company, Kingsport, Tenn.

Reconnaissance of Coastal Plain Problems

Korstian spent the entire month on a trip through the coastal plain of Virginia and North Carolina. His first stop was the Lee National Forest where he was joined by junior forester A. L. MacKinney, and field assistants. After the field party was initiated into the mysteries of the extensive survey work on cut-over loblolly pine lands, Korstian spent a few days with Supervisor H. M. Sears and E. V. Roberts in going over a program of research for the Lee. He then spent about two days each with J. W. O'Byrne, Extension Forester of Virginia, W. L. Gooch, State District Forester for Tidewater Virginia, and with Mr. Roberts in examining cut-over areas in southeastern Virginia. The cuttings of the Surry Lumber Company in Isle of Wight and Southampton Counties were found to be suitable for more intensive study. Visits were also made to Fort Eustis and the Yorktown Mine Depot.

The scouting was continued in North Carolina by Korstian. Lands were examined from Bertie and Tyrrell counties in the north to Brunswick, Columbus and Robeson Counties in the south. In Bertie County Korstian was accompanied by L. A. Carter, District Forester for northeastern North Carolina, in Tyrrell County by H. A. Owens, local representative of the Richmond Cedar Works, in Pender and New Hanover Counties by S. C. Sweeny, Manager of the Cooper River Timber Company, and in the three last named counties by John L. Cobbs, Jr., Director of Public Relations, Atlantic Coast Line Railroad.

During the course of this trip advantage was taken of the opportunity to discuss forestry problems with foresters and timberland owners and to get a line on suitable locations for working centers in the coastal plain. As a result of this trip a list of problems has been compiled which could easily keep the entire Station staff busy for ten years or longer.

Study of Cut-over Loblolly Pine Lands

The investigation of the restocking of cut-over loblolly pine lands which was begun in the spring of 1926 was resumed early in the month on the Lee National Forest near Petersburg, Va., by MacKinney's party under Korstian's direction.

Several cut-over areas near Toano, Va., were studied critically to determine the nature and amount of restocking on unburned lands. The growth of trees released at the time of cutting was also studied on approximately 200 trees on one of the areas cut over about fourteen years ago.

This years work for the most part has substantiated the conclusions of last spring's study. Fire is by all odds the most important factor in preventing adequate restocking on cut-over loblolly pine lands. On the richer soils in eastern Virginia aggressive competition of hardwoods tends to prevent complete restocking with pine, often resulting in mixed stands of pine and hardwoods. On the more sandy soils fully stocked stands of pine can be expected with protection of the cut-over areas from fire, even with a minimum number of seed trees.

Storage of Acorns

To finish up some loose ends of the study of germination and early survival of oaks, some further experiments in acorn storage have been begun under Korstian's direction. About a peck of chestnut oak acorns have been put into a wire mesh container and so placed in Bent Creek that they will be continuously covered with fresh running water. Another peck has been stratified in moist sand and placed in cold storage where a constant temperature a little above freezing will be maintained. A similar quantity has been stratified in sand and buried three feet below ground on a hillside. Three pecks of scarlet oak acorns, as a representative of the black oak group, have been treated in the same way.

Other Seed Collecting

A bushel of mountain pine cones (Pinus pungens) was collected for a special request. It yielded seven ounces of seed which runs about 35,650 seeds to the pound. About a bushel of yellow poplar seeds was gathered. They were sun-dried for a week and a half and a part of them have been stratified and buried about one and one-half feet below ground. This method of storage proved successful last winter. The remainder of these seeds were forwarded to Dr. William Crocker, Director of Boyce Thompson Institute, to be used in seed storage and germination studies. Small quantities of seed of various legumes - honey locust, red bud, and mimosa - were collected and sent in answer to a special request for the seed for experimental purposes.

Forest Insect Studies

The entire month was spent in an analysis of normal and treated beetle infested trees in the vicinity of Asheville, N.C. R. A. St. George returned to Asheville October 10, to aid in this work and went back to Washington October 28. Dr. F. C. Craighead spent the week of October 17, on this work, while William Middleton, also of the Washington office, spent the week of October 24 in Asheville on the same work.

For the purpose of further speeding up the work two temporary men, Robert King and John Warren, were added to the crew during the month of October.

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SOUTHERN FOREST EXPERIMENT STATION

General

Much of the general office work of the month consisted of corrections and changes in project sheets and the preparation of the Station's annual report to the Advisory Council, which met in New Orleans on October 29. The Council approved the report, which included plans for next year's work. It is now being mimeographed for general distribution.

The Council meeting was most successful, being attended by 10 members in person and by substitutes representing four more, as well as by a number of visitors from the Washington office, the Madison Laboratory, and the Southern States. The discussions following the various items of Demmon's report to the Council were lively and interesting, and resulted not only in very stimulating criticism of the Station's work, but also in numerous offers of direct cooperation on the part of several of the Council members.

Preparation of the investigative program prior to the Council meeting included a review of Gemmer's working plans for investigations on the Florida Forest, and Gemmer has since followed up the working plan with a summary, for District Seven, of all current research work on the forest.

L. D. Vining, Superintendent of Naval Stores Field Station, reported for work at Starke October 1, Field Assistant William Koch likewise joining Wyman's staff October 3. Field Assistant L. D. Lloyd reported for duty in New Orleans October 14.

Visitors to the office during the month included State Forester Siecke of Texas, R. D. Garver and R. H. Colley from the Forest Products Laboratory, State Foresters Hogue of Mississippi and Hine of Louisiana, who consulted with the Station concerning possibilities of hardwood investigations next year, and E. N. Munns and J. G. Peters from the Washington office. Wyman came over from Starke to attend the Advisory Council meeting and present the report on naval stores investigations.

Management

Barrett continued the computations of results of thinning at Urania, and prepared an article on thinnings for the 1927 Yearbook.

Barrett and Lloyd spent the latter part of the month on the various management plots at Urania, repairing fences, locating corners, tagging trees and putting up signs.

Wahlenberg installed six milacre seed catchers at McNeill. The catchers are made of inch by six inch board, with a bottom of fine screen wire and a top of half inch square mesh galvanized screening to keep out birds and mice. As an additional protection against mice, Wahlenberg set a mouse trap in each catcher. The catchers, which are raised about a foot above the ground, are placed in a variety of locations with respect to seed trees and should give us much valuable information as to the carrying power of longleaf seed. This is our first trial of seed catchers, and we anticipate excellent results because of the heavy seed crop at McNeill.

New work developed in connection with the grazing project at McNeill should be of great value in the longleaf pine management studies as well. This work consists of sowing small counted samples of seed, one half under wire screen and one half in the open, near each of the present quadrats in the grazing study. The seeds will be dropped lightly on top of the existing grass cover and the resulting germination should give us fairly definite information concerning the ability of longleaf seeds to work through a heavy rough, the suitability of such rough as a seed bed, and the amount of seed removed from our quadrats by birds and rodents.

Gemmer is doing a small amount of additional work with seed catchers at Camp Pinchot, supplementing his study of the seed tree plots established on the Florida a year ago. No seed was produced on any of the seed tree plots themselves, "A great help," as Gemmer ironically notes in his diary.

Naval Stores

During the month of October the thirtieth streak was put on all three tracts of timber at Starke. This completes the chipping season for 1927. There is still one more dip to be made of each tract, this last dip being held up until after completion of scraping. Scraping at Sampson Lake has been completed.

Diameter measurements, to determine growth during working period, were made at D. B. H. and nine feet (outside bark) on several groups of trees put under test in 1923. These trees are to be rested this year. Cone counts on Kingsley tract were put well under way during this month. Coincident with the finish of chipping the last chips were gathered from each tree under test, to be used by Dr. Gerry of the Forest Products Laboratory in microscopial studies.

In the environment study a comparison of yields from all daily weighing groups has been obtained under identical weather conditions to be used as a basis for adjusting yields in working up results.

In addition to continuing the general checking up of records which are being transferred to permanent office forms, material was collected on the effect of chipping methods on yield of naval stores and the yield of gum from slash and longleaf pine, and the articles written and submitted by Mr. Wyman for the 1927 Yearbook.

Mr. Wyman attended a meeting of the clients and customers of the Baldwin-Lewis-Pace Naval Stores Company in Jacksonville on October 19 where he was on the program of speakers with Mr. Geo. Shingler of the Bureau of Chemistry, Mr. J. C. Nash of the Columbia Naval Stores Company and Mr. Carl Speh of the Pine Institute of America. About 125 operators were in attendance, the largest number we have ever seen together.

Prior to the annual Demonstration Fair, held by the Woman's Club of Starke, the Starke staff spent a few days preparing an exhibit for this station, which included posters designed to show naval stores products and their derivatives, as well as the character of work we are carrying on.

Forestation

Wakeley finished the preliminary report on Professor Hayes' study of the Great Southern Lumber Company plantation, forwarding a copy to the Company's Forester.

The Great Southern Lumber Company has built a seed extracting plant at Bush, Louisiana, which Wakeley visited and concerning which he made several suggestions to the Company. The plant as originally built contained no vents whatever for the circulation of the air, and even at the time of Wakeley's visit was very inadequately ventilated by flues opening in the side walls instead of extending above the peak of the roof. The Company is undertaking to extract two and one-quarter tons of longleaf seed this fall.

Miss Regan spent practically the entire month on computations of germination and mortality in the 1925 and 1926 nurseries, together with temperature studies in connection with an attempted analysis of the effect of temperature upon rapidity and final amount of figure germination.

Gemmer has spent considerable time gathering and measuring cones and extracting seed at Camp Pinchot, partly in connection with the natural reproduction studies, but more in connection with proposed work in forestation and in the study of seed production. So far he finds the larger cones on the younger trees on good sites, and the smaller cones from old trees on an exceptionally dry ridge. He plans to make germination tests at Camp Pinchot.

Protection, Others

Grazing. Wahlenberg went over very thoroughly the photographs and accumulated records of the grazing project at McNeill, and has decided on several improvements in the work, including the seed dispersal and germination tests already described. He has devised an ingenious soil sampler for rapid collection of soil samples for moisture determinations on the burned and unburned areas, and hopes to include in his further work an analysis of the effect burning has on moisture content. He has also set some necessary stakes and cleared up some doubtful points in connection with seedling ages and growth rate of saplings in the Pa-1 pasture.

Insects. Longleaf pine cones supplied us by lumber companies or collected by ourselves show considerable damage from insect larvae, but to date a sizeable moth, which the Bureau of Entomology has identified for us as Dioryctria abietella is all that has been obtained from the specimens. Additional cones are being kept for possible later emergencies. Gemmer reports a heavy loss through insect damage in the cones collected at Camp Pinchot, usually through an extreme pitchiness which prevents even the undamaged portions of the cones from opening.

Diseases. Gemmer's needle blight quadrats at Camp Pinchot show almost identical losses on the burned and unburned areas when expressed in per cent, but a glance at the absolute figures tells a different story. The unburned quadrat had a stand of 12,048 per acre seedlings at the time of establishment, of which 5,301, or 44 per cent, have died during the summer. The burned plot had a stand of 3,849 seedlings per acre when established, of which 1,541, or 40 per cent, died during the summer.

The longleaf pine plantations, natural young growth, and nursery at Bogalusa seem unusually free from blight this fall, and the five-year-old planted trees on which fairly heavy infection was noted last July have grown slightly more than a foot in height in the ensuing three months.

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PACIFIC NORTHWEST FOREST EXPERIMENT STATION

October sees practically the end of all our field work for 1927, and a beginning made on the major office tasks of the winter.

A resume of our photographic efforts for the season shows 356 usable pictures taken by the several members of the staff and added to our files. All are 4x5 in size and the author anyway thinks A-1 in quality. More than half of them were taken to illustrate the record of permanent plots of one kind or another. The others were taken to build up our basic collection of pictures of our work and of forest conditions, for use in articles, lectures, etc.

Munger was in the office most of the month but had short trips to Wind River and to the natural reproduction plots on the Cascade Forest near Westfir. He also attended a meeting of the Oregon State Board of Forestry to explain to that body the value and uses of a forest type map and timber inventory, which the State is considering making. At the request of the Extension Department of the Oregon Agricultural College a summary of the minimum requirements report for the Douglas fir region (Bulletin 1493) was prepared to be used as program material for farm organization.

Westveld and Meyer made the fall examinations on the Deschutes slash-disposal plots, and the annual reproduction counts on the Whitman methods-of-cutting plots. Following

this a rapid trip was made through the western yellow pine region of central and eastern Oregon with the view to formulating ideas about the prospective growth study and to locating possible areas where such a study can be carried on. A number of areas of almost even-aged second growth were looked into. Stands of any acreage gave the appearance of understocking. When contrasted with the very heavy stands of advance growth and reproduction so often found they are hard to explain, beyond the fact that fires have occurred intermittently in practically all of the older stands. Since many of the stands resulting after logging resemble an even-aged forest and may accord with the growth trends of such a type, normal yields may have to be drawn up ultimately. If this is done a most diligent search will have to be carried on since stands of older ages are few and far between.

Both Westveld and Meyer came in to Portland October 20 and settled down to the job of computing their season's "catch" of data.

In the final plot examinations of the Douglas fir natural reproduction studies, Isaac reports the areas as a whole netting a number of 1927 seedlings quite proportional to the seed crop of 1926. A considerable number of seedlings were found in the vicinity of a heavy seed crop while a negligible number were found where the crop was light.

It is interesting to note that on both the old and the new seed tree sample plots most of the trees had a good crop of 1927 cones while the crop on adjoining green timber was light and uneven. For the season of 1927 at least it answers affirmatively the question whether or not Douglas fir seed trees actually produce seed.

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NORTHERN ROCKY MOUNTAIN FOREST EXPERIMENT STATION

With the departure of the field assistants in September, all members of the permanent staff were assembled at the Priest River Branch for the establishment of several new methods-of-cutting plots and the annual fall examination of several hundred reproduction quadrats on existing plots. This arrangement continued until the middle of October, when Weidman and Gisborne returned to Missoula. Kempff and Marshall continued chiefly on quadrat examinations through the remainder of October.

The early part of the month was marked by several worthwhile visits. Assistant Forester Clapp spent four days with us, three of which were devoted to going over in the field the active projects at the Priest River Branch. We were able to show him a considerable number of permanent yield, reproduction, and methods-of-cutting plots on and near the demonstration forest established since his last visit there two years ago. Due to concentration of effort in the Priest River experimental center, it is now possible without long and scattered field trips to show interested foresters and lumbermen a number of permanent experiments in a variety of yield, reproduction, thinning, and methods-of-cutting projects.

Immediately following Mr. Clapp's visit, Assistant District Forester Koch spent three days at the Priest River branch. The greater part of this time he cooperated actively with the staff in starting the establishment of two methods-of-cutting plots in our timber-sale area on Benton Creek. On one of these plots the residual understory trees, largely of hemlock, cedar, and white fir, were left standing, and on the other all of the residual stand except a few of the soundest trees was felled. The purpose here is to determine what sort of a crop the residual stand, largely of secondary species and partly defective, will produce as compared with a crop of healthy second growth starting from seed after cutting and containing a large proportion of white pine.

The handling of understory timber is very much of a problem in logging in the western white pine type. There is a strong feeling on the part of Management that such suppressed hemlock, fir, and cedar will never make a profitable cut and in any event will prevent or greatly retard the starting and development of white pine reproduction. The Experiment Station now has six plots, established and in the course of being established, which are devoted to this problem. Two of these plots have just been given their second annual examination by Kempff and Marshall, who report 31,775 seedlings per acre as having started this year. Only 325 seedlings per acre of this huge crop are white pine, the remainder being chiefly cedar and hemlock. The results of this examination are interesting in two ways. In the first place, they show vividly the small amount of white pine that comes in under these conditions, and in the second place they reflect the very favorable combination of a prolific seed crop in 1926 followed by the unusually wet summer of 1927. On these same plots the total number of established seedlings on the ground the first two years after cutting was only fifty per acre. It is only fair to state in this connection, however, that 1925 and 1926 were somewhat drier than usual.

Mr. Evenden and Mr. Gibson of the Bureau of Entomology spent one day with Kempff and Marshall in studying the work of Dendroctonus monticolae on one of our plots laid out last summer in a 1926 burn. Out of the 129 white pines on this plot which were living in June, 42 (33%) had died by the end of October. The entomologists concluded that in only two of these 42 deaths the insects could be held as primary agents of mortality. The other 40 trees would have died from fire injury regardless of insects.

Of the 129 white pines on the plot, 53 were hosts to Dendroctonus. The ratio between attacked and unattacked trees varied with diameter, a much lower percentage of the small, smooth-barked trees than of the larger pines being infested. The following table illustrates this point:

Diameter Class:	Attacked	Not Attacked	Per cent Attacked
6-10"	9	42	18
11-15"	25	30	46
16-20"	14	3	82
21-25"	5	1	83
Total	53	76	41

The infested trees were further subdivided into those which were successfully attacked, and those which were not. In the latter case the tree emitted enough pitch to drown out, or pitch out, the insects, while in the former the insects were girdling the cambium without arboreal opposition. Thirty-four of the attacks in this plot were successful, while only 19 were pitched out.

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SOUTHWESTERN FOREST EXPERIMENT STATION

Krauch and Lexen have been in the field throughout September and October remeasuring sample plots on the Carson, Gila and Lincoln. Krauch reports excessive windfall on the tie cuttings in the Engelmann spruce type on the Carson. The western yellow pine plots on the Gila cut 15 years ago are almost completely restocked and the growth of young trees is exceedingly vigorous.

Thinning plots have been established on the Long Valley and Bly Districts of the Coconino, in cooperation with and at the ini-

tiation of local forest officers. The records are being kept in the experiment station files, but it is planned to have the Rangers participate in future measurements.

A series of thinning plots in western yellow pine saplings on Decker Wash of the Sitgreaves, established two years ago, was recently examined. The original stocking was about 50,000 per acre with saplings three to four feet high. Substantial growth has been made on both the thinned and unthinned plots. Thus far, there is no striking difference in height growth, although the color seems better on the thinned plots. A factor which will tend to counteract the beneficial effects of thinning is the native grass cover. Apparently a fairly dense grama sod occupied the surface when the seedlings started. At the time of thinning, the grass was apparently in the last stages of subjugation. It is now reasserting itself where the spacing of seedlings is over three feet. How much of a factor this will be remains to be determined.

Plots designed to determine the amount of damage to forest reproduction by grazing on individual allotments were established on the Sitgreaves and the Coconino. The general plan is to put in at least one fenced plot of from one-fourth to one-half acre on each allotment. Within this is one or more small plots on which all pine seedlings are recorded. In the vicinity of each fenced plot are several seedling plots outside the fence. Sheep damage has been very light this year. This is attributed to three causes: (1) lighter stocking than in the past; (2) a short grazing season (most of the sheep left the forest a month early), and (3) excellent forage conditions due to copious and well distributed rainfall. The latter condition, together with reduced stocking on the outside range, is what made it possible for the sheepmen to use the forest ranges lightly this year, and the pressure brought to bear upon them by the Forest Service during the past two years is undoubtedly what has caused them to take advantage of this opportunity. The crucial test will come in average or subnormal years when the outside range is overstocked instead of understocked. Cattle generally are doing more damage than sheep this year. A recent count on one cattle allotment revealed a hundred per cent excess, and the distribution is far from what it should be.

An exceptional seed crop of western yellow pine occurs all over the Colorado Plateau, and probably throughout Arizona and New Mexico. If the summer rains are a little above average next July and August, seedlings should appear in great numbers. As far as the seed supply is concerned, the stage is set for another 1919. What the real outcome will be depends upon the weather - and grazing.

Mr. Horn of the Biological Survey has placed poison porcupine cups in trees on and around most of our sample plots. Cups have also been placed along several major lines of migration.

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ROCKY MOUNTAIN FOREST EXPERIMENT STATION

October Activities

As has been the custom in the past, October brought to a close the field season at the Fremont Station. The third of a series of three plots to be cut over under the management plan was marked, and the final clean-up, including brush scattering, was effected on the plots cut-over this year. Incidentally, on the last plot marked for 1927-1928 cutting, another natural lodgepole pine, 6" in diameter, was found. This is the second tree of this species found growing naturally within the Station area.

The various western yellow pine and Douglas fir cone lots collected this fall were threshed, and a good supply of seed was obtained with which to carry further the heredity tests with these two species in the spring. Six of the twelve cans in the mass transpiration test were resown to lodgepole pine, Douglas fir and Engelmann spruce, in order that a full stand of young trees may be obtained as soon as possible. The transplants upon which we have depended in the past for future full stocking have grown too slowly to insure final accomplishment of the result desired.

One week was spent remeasuring the four Douglas fir thinning plots in Jarre Canyon on the Pike Forest. At the same time two reproduction quadrats were established on each plot. Counts made showed that very little reproduction has come in since cutting in 1921, and on the heavily covered check plot it is evident that no reproduction will come in until the stand is opened. The percentage of new trees varies more or less directly with the degree of cutting.

Diameter increment since the 1924 remeasurement has been greatest on the heavily thinned plot with a spacing of approximately 8 x 8 feet. Height growth, especially of the trees in the one inch and smaller class, has been extremely fast. However, growth in the lightly and moderately thinned plots has also been fairly rapid, and indicates possibly that a moderate thinning

may be silviculturally more desirable than a heavy one, although when cutting for Christmas trees, the heavier one has a decided advantage from the financial standpoint.

Each tree in the plots was studied for pitch girdle, a disease, most likely of bacterial origin, that causes considerable loss in local sapling stands. Until the data are analyzed nothing definite is to be said concerning this pest. It is evident, however, that thinning helps to prevent the rapid spread of the disease, for in uncut stands it is found to occur in characteristic pockets and appears to work outward from promiscuously scattered centers.

November Plans

The first part of the month will be spent in getting the office straightened out with particular attention to be given the compilation files. As soon as possible thereafter, two Pike projects will be worked up, namely, the grazing study of fenced and unfenced denuded areas and the Douglas fir thinning plots previously discussed.

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MANUSCRIPTS

Washington Office

A Modification of Bruce's Method of Preparing Timber-Yield Tables. L. H. Reineke. (Galley Proof, J.A.R.)

Northeastern

Forest Fire-Weather Research in the Northeast. Paul W. Stickel. (1927 Yearbook).

Reproduction Conditions on Cut-over Pulpwood Lands in the Northeast. M. Westveld. (1927 Yearbook).

Pacific Northwest

Interference, by A. G. Simson. (Note for "Science.")

Seed Flight Measured to Aid Reforestation. Leo Isaac. (1927 Yearbook).

Southwestern

Grazing in the Pine Forests of the Southwest. G. A. Pearson. (1927 Yearbook).

Southern

Yield of Gum from Slash and Longleaf pine. L. Wyman. (For 1927 Yearbook)

Effect of Tapping Methods on Yield of Naval Stores. L. Wyman. (For 1927 Yearbook)

California

Wind Sown Tree Crops. Howard W. Siggins. (1927 Yearbook).

Central States

Forest Cover as a Factor in Flood Control. E. F. McCarthy. (Presented at the meeting of the American Society of Civil Engineers, October 13, 1927, Columbus, Ohio).

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IN PRINT

Boyce, J.S. Losses in Windthrown Timber. Timberman, August, 1927.

Boyce, J.S. Decay and Seed Trees in the Douglas Fir Region. (Jour. For. November, 1927.)

McArdle, R. E. and Roy A. Chapman. Measuring Tree Heights on Slopes. (Jour. For. November, 1927).

Sparhawk, W.N. Cooperative Forestry in Finland. (Texas Forest News, Sept. 1927.)

Wackerman, A.E. The Marginal Ditch and Swamp Drainage for Forestry. (Jour. For. Nov. 1927.)

Zon, R. and R. D. Garver. Selective Logging in the Northern Hardwoods of the Lake States. (Advance Report, Published by the Northern Hemlock and Hardwood Manufacturers Association.)

Zon, R. Forests and Water in the Light of Scientific Investigation. (Reprint of Appendix 5 of the Report of the National Waterways Commission.)

Isaac, L.A. More seeds - More trees. (Forest Patrolman, September, 1927.)

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OFFICE OF FOREST PRODUCTS - District One

Sawmill Studies

A preliminary review of the data compiled in studying the effect of size and defect upon the cost of production and the values received from logs of several Inland Empire tree species shows some interesting information. The comparisons were made strictly upon a cost-versus-value (per M feet log scale) basis. No consideration was given to the position of the log in reference to skid trail, chute or landing, or to any other factor which might influence the cost of logging, outside of size and the per cent of defect. Neither stumpage nor margin for profit and risk were included in the production cost figures.

Some of the general results obtained from the western white pine data follow: In defective logs 6, 7, and 8 inches in top diameter the cost of production far exceeds the value per M feet log scale. The defect in these diameter classes averages 61, 49, and 43 per cent, respectively. Nine-inch logs containing up to 20 per cent of defect show a value per M feet log scale in excess of the cost of production. In 13-inch logs the per cent of defect may be increased to 25 and a profit will still result. Butt logs 14 inches in top diameter and containing 36 per cent of defect show a value higher than the production cost. It is not until the 17-inch diameter class is reached that both butt cuts and middle logs (Grade 1 Select and 3 Common) 36 per cent defective can be removed at a profit. Idaho white pine logs 41-50% defective may be removed at a profit (on the basis of cost versus value alone) if they are Grade 1, 2 & 3 logs 20 inches and over in top diameter. In 23-inch logs the per cent of defect may be increased to 54 and a profit will still result. Large logs containing more than 60% of defect will not show a value per M feet log scale in excess of the cost of production (on the same basis), unless they are butt or middle logs of select grade. Among logs of the same top diameter log position in tree and grade, the kind of defect will often determine the profitable defective limit.

Wood Preservation

During the period from September 20 to October 8 Mr. Whitney and Mr. George M. Hunt completed a series of inspections which included a study of the methods of treatment being used at twelve commercial treating plants, an investigation of the results being obtained with various preservatives where experimental work is being carried on, and inspections of treated timbers in several service test projects.

After making the first inspection of the treated fence posts at the U. S. Range Livestock Experiment Station, Miles City, Montana, where Mr. Hunt arrived on September 20, two days were spent with Supervisor Agee of the Big Horn Forest and Mr. O. A. Bartholomew of the Clear Creek Timber Company at Sheridan and Buffalo, Wyoming, in connection with the proposed treatment of lodgepole pine posts for the general market. The Clear Creek Timber Company had previously requested information on the essential equipment and cost of a small modern pressure treating plant for use in the commercial treatment of lodgepole pine posts and other data concerning the methods of treating and handling fence posts. Some information was contributed which may be of value in attempting to develop a treated post business which would utilize material cut from the tops of tie trees on Forest Service timber sales.

The company now has about 18,000 untreated lodgepole pine posts on hand and 3000 which have been treated by the ppentank method, using a 50-50 mixture of creosote and coal tar as the preservative. Although long service may be expected of the butt-treated lodgepole pine posts in Wyoming and other Rocky Mountain states, in other territory including parts of the Middle West posts of this species should be given a full length pressure treatment.

An inspection was made of the Burlington Tie Treating Plant at Sheridan in company with Supervisor Agee and Mr. Hunt. Both the Card and Burnett processes are used at this plant, which has an average output of about 80,000 treated lodgepole and western yellow pine ties per month.

While in the vicinity of Anaconda, Montana, a very thorough investigation was made of the new methods of treatment which are being developed by the Anaconda Copper Mining Company, in which Cold Treater Dust or arsenical solutions are being used. The most dependable service test records on the treater dust method of preserving timbers are those covering some lodgepole pine posts set on ranches in the Deerlodge Valley near Anaconda about four years ago. These posts were inspected in company with Dr. H. C. Garliner and R. J. Caro of the Anaconda Copper Mining Company and at the present time show very little evidence of decay. The Cold Treater Dust appears to be showing up well in preventing decay on these pine posts and is also showing good results with some western red cedar poles installed by the Washington Water Power Company of Spokane, Washington, in November, 1923. These poles were inspected on October 8, after being in service about four years. This method of treatment is still in the experimental stage and must be kept under observation for some time before it can be recommended by the Forest Service.

For the past two years the Anaconda Copper Mining Company has been carrying on an extensive series of experiments using solutions of arsenical salts for mine timber preservation and on January 9, 1927, began to substitute water solutions of sodium arsenite for the cresoil treatments which had been employed during 1925 and 1926. A number of mine sets treated with several different solutions of this salt, also some sets treated with cresoil, Ac-Zol and Wolman salts have been placed in the Butte Mines for tests. Inspections were made of some of these timbers at the Original, Leonard and Emma Mines. The older creosoted timbers placed in the Original, Berkeley and Tramway Mines in 1911 were also inspected and found to be in very good condition.

Other inspections made in the course of this work included the Chateau-Ear Mountain Telephone Line on the Lewis & Clark Forest; the Great Northern Tie Treating Plant at Somers; the Northern Pacific Tie Treating Plant at Paradise; the Northern Pacific Test Track at Plains, Montana; a number of cedar pole treating plants at Sandpoint, Idaho, and the new Washington Wood Preserving Company plant at Hillyard, Washington. Many different methods of treatment and variations in treating practice were discussed at the different plants visited and much benefit has been derived from Mr. Hunt's field trip in this District.

Mr. Earl Clapp Visits the District

Mr. Clapp stopped for a day at the District office on his way East. Before coming into Missoula, Mr. Clapp spent several days in company with members of the staff of the Northern Rocky Mountain Experiment Station at field headquarters, Priest River, Idaho.

Lumber Prices and Movement

Prices	Annual 1926	First Q. 1927	Second Q. 1927	Third Q. 1927
Idaho White Pine	$37.77	$38.48	$38.41	$36.77
Pondosa Pine	26.33	26.28	26.72	25.97
D. Fir and Larch	17.78	17.62	18.92	18.83
White Fir	19.10	16.46	18.02	18.56
Spruce	23.73	23.77	24.09	23.34

	October, 1926	October, 1927
Cut	159,033	134,059
Shipments	176,788	139,293

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Heptane

The field work on heptane was terminated on October 1. Mr. Tihomiroff is now working up the results. While resin flow curves are being plotted, no extended interpretation can be indulged in, in advance of the criticism of the statistical sufficiency of the data which the Branch at Washington has promised to supply us with. It will be of interest, however, that on this Eastern Sierras site at approximately 6000 ft. elevation, the average yield per cup per week for the entire period and the total number of trees is 0.210 lbs. This is rather unexpectedly higher than the yield of 0.173 lbs. obtained in the tapping experiments of some fifteen years ago on the west side of the Sierras and at lower elevations. Another unexpected result is that the average yield of large mature trees per cup per week is larger than that of blackjacks (young trees), the former being 0.220 lbs. and the latter 0.181 lbs. Besides the curves of oleoresin flow, the soil records and soil moisture data are being worked up and also data bearing on the dendrological and anatomical distinction between Jeffrey pine and western yellow pine.

California Economic Research Council

At the semi-annual meeting of the Council, Mr. Hill presented a report for the Natural Resources Committee. This report showed progress by the Committee in assisting or forwarding research work now under way on the effect of oceanographic factors upon the climate of California, at the Scripps Institute of Oceanography at La Jolla; and on earthquake studies; and in efforts toward having research work undertaken in comparative studies of air and soil temperatures; a survey to determine the presence of fur seals and sea otter in California; and a land use survey for California. A resolution was also obtained from the Council approving the McSweeney Bill.

Lodgepole Pine Utilization

In accordance with a request from District 1, Mr. Brundage has given some time to securing information on the utilization of lodgepole pine in California.

Laboratory Redwood Project

On account of the other demands upon the time of Mr. Hill and Mr. Kotok, the visit to this project which they had hoped to make was taken by Mr. Brundage. He went carefully over the work being done, with Mr. Luxford, especially from the standpoint of the designation of sample trees and the correlation of records against the possibility of biological observations which may be undertaken by the Experiment Station in the event of future extension of the redwoods investigation by the Laboratory. A report has been prepared by Mr. Brundage which will be submitted to the Laboratory upon receipt of Luxford's comments.

Administrative

Mr. Hill's time was largely taken up during this month by the District Ranger Training School, which began at the Feather River Experiment Station on October 3.

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OFFICE OF FOREST PRODUCTS - District Six

Degrade Study, Kiln-dried Douglas Fir

Reference was made last month to the degrade study which was in progress at the plant of the Oregon-American Lumber Company's plant at Vernonia, in cooperation with that company and the West Coast Lumbermen's Association. Johnson, with the assistance of Spelman, brought the field work to completion the middle of the month. The report is now well toward completion; in another three or four days copies can be sent to the cooperators and the Forester. Comment, as to the findings, will be withheld till next month. At this time, it may be said that Johnson has done a very excellent piece of work, a job that will reflect credit to both himself and the Service. And the report will show that progress is being made in the kiln-drying of No. 1 Douglas fir Common, in reducing the degrade and bringing the stock to a more or less uniform moisture content.

Mill Utilization Study

Much of Gibbons' time has been given over to planning of the mill utilization study which is to be made at the plant of

the Mt. Emily Lumber Company, LaGrande, Oregon, largely in connection with western yellow pine. The study starts November 7 and will continue for two weeks. The field party will consist of ten men, including two high-class lumber graders. The Office of Forest Management is contributing three men. Mr. Bradner, Office of Forest Products, District 1, is numbered in the party. The other four members are drawn from the local Office of Forest Products - Johnson, Spelman, Hodgson and Gibbons.

Test Material

Spelman at present is in the field arranging for the shipment of a car of Sitka spruce and Douglas fir logs to the Forest Products Laboratory.

General Woods Waste Survey in the Douglas Fir Region

Hodgson is devoting all his time to the preparation of the report dealing with this study. A mass of detailed information was collected in the field, and as was anticipated it is going to take a lot of time to prepare a creditable and worthwhile report.

Felling and Bucking Study

What with helping on the degrade study, referred to above, and some other odd jobs, Spelman was unable to report any progress on this study. However, so far he is not behind the working-plan schedule.

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RANGE RESEARCH

WASHINGTON

Mr. Chapline returned from his summer inspection trip on October 31 and reports a very successful summer. His main purpose during the trip was to aid speeding up publication of the numerous manuscripts now under way. He reports reviewing during the summer seven manuscripts in various stages of completion.

The early part of the month of October was spent at the Jornada Range Reserve especially for the purpose of considering the analysis and presentation in Mr. Schoeller's Jornada carrying capacity report, and also for considering the status and plans of the investigative projects with Messrs R. S. Campbell and Roy H. Canfield. While at the Jornada, Chapline spoke to the Las Cruces Kiwanis Club on erosion research in the Forest Service, giving it a local application to the importance of watershed protection to the Elephant Butte project. Considerable interest in the subject was aroused and upon the request of several members of the club, the statement was published in the two Las Cruces papers. Chapline also spoke to the Agricultural Club of the New Mexico Agricultural College on range research in the Forest Service. This statement was also published in the local farm paper.

In Tucson several days were spent with Prof. W. G. McGinnies, formerly in charge of range research in Montana, in considering his report on the investigations which he conducted on the Madison National Forest. This report which is also in final form is being prepared for a Journal of Agricultural Research article and will also be used by Prof. McGinnies for his doctorate thesis at the University of Chicago. McGinnies is handling a Purnell project for the University of Arizona covering a survey of sheep ranges in Arizona. Most of the balance of the time in Tucson was spent in considering the Santa Rita bulletin which is being prepared by Culley and Hill. Two days, however, were spent in the field on the reserve. In Tucson, Chapline also spoke informally to the University of Arizona Chapter of Alpha Zeta, the honorary agricultural fraternity.

One day was spent in Phoenix, Arizona, where he ddiscussed the southwestern range research work with representatives of the Arizona Cattle and Horse Growers Association, the Arizona Wool Growers Association, the Salt River Valley Water Users Association,

and several prominent citizens who evinced considerable interest in the work being done. Short stops were also made on the return to Washington at the District Offices in Albuquerque and Denver. In Denver a conference was held with former Extension Forester Chester A. Lee of the Colorado Agricultural College on radio broadcasting of range research results. Mr. Lee has made a special study of radio broadcasting and had many worth-while suggestions to make. Prof. Hansen, also of the college, attended the conference and discussed the range research work which he is conducting in Colorado. A short conference was also held with Secretary T. W. Tomlinson of the American National Livestock Association and with Mr. Warming, the editor of the Producer, particularly with reference to the series of articles on range research which are being prepared for the Producer. Brief conferences were also held with the professors of the University of Nebraska at Lincoln.

Publications

Range Research is represented in two articles submitted for the 1927 Yearbook, "Range Forage for Profitable Livestock Production" by Chapline and "Grazing and Watershed Protection" by Forsling. Mr. Barnes has two articles, "Longhorn Cattle to be Saved from Extinction" and "The Cattle Business Made to Pay."

Mr. Schoeller's "The Cost of a Range Calf" was published in the October issue of the Producer, as one of the series of articles which Range Research is supplying to that publication.

Mr. Dayton has two papers in print:

"A few notes on plant names," Proc. Biol. Soc. Wash. 40: 117-118. Sept. 26, 1927. For a little paper this seems to have created quite a stir! Included in the "returns" are an investigation by Dr. Coville and Prof. Hitchcock, a letter from a college president in New England, and letters from two botanists in California.

"New names for some western montane plants," Proc. Biol. Soc. Wash. 40: 119-122. Sept. 26, 1927.

He also submitted the following manuscripts:

"Five plant collections from the Alaskan National Forests." Submitted to the American Journal of Botany, illustrated.

"Callisteris violacea Greene." Submitted to Bulletin of the Torrey Botanical Club, illustrated.

"A new Gilia from the Montezuma National Forest." Submitted to the Bulletin of the Torrey Botanical Club, illustrated.

Mr. Forsling's manuscript "The Relation of Herbaceous Vegetation to Surface Runoff and Erosion on High Mt. Watersheds" was returned from the editor the latter part of the month. It is believed this manuscript will be of considerable interest in view of the general interest of the public at the present time in flood control.

Range Research to be Represented at the International

The material submitted by Director Matt J. Culley of the Santa Rita Range Reserve for an exhibit was worked into a feature for the International Livestock Exposition to be held in Chicago the latter part of November and the early part of December. The Forest Service part of the exhibit will be one of the largest and most elaborate, which is the first time the Forest Service has been so represented. The exhibit will be available for distribution on the State Fair Circuit after it has served its purpose at the Chicago International. In the press release of November 2, the Department has made the following statement in regard to this exhibit:

"Sufficient proof to convince the most skeptical rancher is contained in a feature contrasting the curse of overgrazing with the benefits to be derived from conservative grazing of our western range lands. A line fence bisects a western panorama showing herds of beef cows and calves busy converting grass into beef. On one side of the fence the depleted soil and sparse, scraggly vegetation show the tell-tale signs of overgrazing, which is reflected in the thin, "leggy" cattle in the foreground. Across the fence are sleek, well-filled cattle of the same breed, enjoying an abundance of grass as a result of proper stocking by a ranchman who apparently appreciates that grass, like all crops, must be given a chance. To prove the sound advantage of the one system over the other, data are quoted from a series of ranch studies by the Forest Service covering twelve years. Overgrazing was found to result in an average calf crop of but 53 per cent, while proper grazing averaged as many as 78 calves for each 100 cows. Death losses in the former case were 10 per cent as against but 3 per cent for the latter. Finally the mismanaged ranches suffered a loss of 5.8 per cent on their investment while the system advocated by the exhibit enjoyed a profit of 7.4 per cent."

Courses in Range Management at the Schools

A digest was prepared during October of the courses in range management, and closely allied subjects, given by various schools. Twenty-six schools were solicited for information along this line, two of which have not yet been heard from. Nine of the 24 reporting schools have a definite and specific course (or courses) in range management, while four have a more or less elaborate curriculum prepared in this subject approximating to a school in range management. In addition, another school is now organizing such a curriculum. Two, and perhaps four other schools are also definitely interested along this line. Only three of the reporting schools have definitely stated that they are not interested in teaching range management.

FORAGE INVESTIGATIONS

Plant Routine for October

Nine collections, representing 474 specimens, were submitted to the Bureau of Plant Industry for identification during the month. Two hundred and forty three plants were mounted. About one thousand were filed in the herbarium.

Dr. Charles Piper Smith donated 21 sheets of lupines collected by him the past season on the Absaroka, Bitterroot, Gallatin, Kaniksu, Missoula, Tahoe and Umatilla National Forests. Mr. Tidestrom has presented us with a carbon of the first draft of his lupine key for the Flora of Arizona. It contains the names of 25 species accepted as valid; eight of these species bear the names of their original collectors and it is of interest to note that two of these (Lupinus blumeri and L. hillii) bear the names of Forest officers, who collected the types on National Forests in connection with their official duties.

Miss Hayes Assists in Nature Study at Weightman School

Friday, October 21, Miss Hayes, on request of Miss Scott of the District public schools, made a trip to the Weightman School for the purpose of accompanying a fifth-grade Nature Study class to Rock Creek Park. The children were taught the names of the more important and abundant native species of trees.

Simple explanation of tree life activity, such as respiration, water conduction, food storage and transfer, leaf fall, and winter buds, proved very interesting to the children.

A photographer and reporter from the Washington Star were present, and pictures were taken of the group at work which appeared in the Sunday Star for October 30.

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DISTRICT 3

Finishing planned work connected with the project of grazing management and utilization in the sawtimber type on the Coconino Plateau has been the aim during October. It is felt that satisfactory progress has been made this season in initiating this study for determining methods of range management that will assist in securing adequate forest protection in the western yellow pine type.

Removal panel enclosures used for the control of forage utilization were all closed before the removal of cattle from the cattle range under study. The data on forage utilization and composition were collected for these panel areas as well as the areas surrounding the reproduction plots within the panels and for those plots throughout the range. A grazing utilization survey of forage was completed on both the sheep and cattle range following the removal of stock, on the cattle range the remnant was being gathered.

Early October weather was very satisfactory for field work, but the last week of the month brought cold rains and snow, concluding the field season with a few jobs we would like to have seen done. Our principal worry now is for weather that will permit moving to winter work at Roosevelt before the road south becomes snowbound.

Cooperrider spent the early part of the month on vacation in the Ohio Valley region. A glance at once-familiar portions of eastern Ohio, western Pennsylvania and northeastern West Virginia was very interesting, especially from the standpoint of timber-growing possibilities, live-stock grazing, bluegrass cover on the limestone hills and watershed values.

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JORNADA RANGE RESERVE

Range Conditions and Precipitations

Practically no precipitation has fallen this month. The arrival of cool days and cold nights indicate that the growing season is at an end. There is ample feed to carry all of the stock on the Reserve through the winter and spring in good shape as a result of good forage growth the past growing season.

Condition of Stock

The breeding herd was moved from summer to winter pasture during the middle of the month, owing to the tobosa and similar type range becoming dry and unpalatable as a result of low rainfall. All stock on the Reserve are in excellent condition.

Efforts are being made to determine the cause of the death loss this month of several cows and calves.

Thirty-eight pure-bred bulls arrived on the 6th of the month to replace a like number of old bulls which will be sold this winter for bologna.

Calf Sales

Fifty-two selected heifer calves were sold this month for breeding purposes. These heifers averaged about eight months of age, weighed 425 lbs., and at 9½ cents a pound, sold for $40.33 per head. The State College purchased these heifers for foundation stock for their range herd at the State College Ranch adjoining the Jornada. The calves were of high quality breeding and showed good conformation. This brings out clearly the value of conservative stocking and improved methods of range and cattle management that have been developed on the Reserve.

Improvement Work

A 7,500 gallon tank for domestic water and a 60,000 gallon tank for stock water are being installed at the station headquarters and should be completed by the middle of November.

Investigative Work

Work on the clipping studies was terminated on October 18, approximately two weeks after the close of the growing season. The 20 quadrats involved in these studies are being charted at the present time.

Schoeller has been applying most of his time to the revision of the carrying capacity manuscript. Schoeller's article, "The Cost of a Range Calf" was published in the October issue of the Producer. The figures in this article show that with a 70 per cent calf crop, an interest of considerably more than 6 per cent would be derived from a ranch investment with calf prices as high as they are this year.

Predatory Animal Control

The Biological Survey has a crew of men engaged in poisoning coyotes on the Jornada. This project will be completed during November. The survey men will probably resort to traps in a few days, since the coyotes are becoming educated to poison baits and do not take them readily.

The question as to the advisability of killing coyotes has come to the front this year, in view of the great increase in jack rabbits, kangaroo rats, and other rodents at the station during the last two years. The rodents are doing far more damage at present than the coyotes, so it may prove best to allow these natural enemies of the rodents to increase for the next few years.

Dona Ana County Fair

The station furnished one man from October 19 to 22 in connection with the Elephant Butte Project Fair. The illustrated Forest Service exhibit was placed on display and attracted much attention from stockmen and farmers. The idea that conservative stocking is of vital importance both for the maintenance of palatable forage on the range, and for the prevention of erosion and silting of irrigation dams seemed to be well appreciated.

Visitors

Mr. Chapline arrived September 27 for his annual inspection. He checked over field methods and results with Campbell and Canfield, and reviewed Schoeller's carrying capacity manuscript. He left for Tucson, Arizona, on October 13.

Dr. Frederick E. Clements and his wife, of the Carnegie Institution of Washington, Dr. W. P. Taylor of the U. S. Biological Survey, Tucson, and Dr. B. C. Tharp of the University of Texas, visited the Reserve during Mr. Chapline's stay, with a view of coordinating the work that is being done on the Jornada with other ecological work in the Southwest. They were especially interested in the vegetative work, including the clipping studies and the snakeweed study. Dr. Taylor was more particularly interested in the damage done by rodents, and would like to see funds provided for an expansion of experimentation on rodent eradication and control at the station.

Personnel

Schoeller returned to the station on September 30 from two weeks sick leave in the Beaumont Hospital.

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SANTA RITA (Sept.)

Range and Stock Conditions

Range is excellent over the entire Reserve with the forage curing rapidly during the latter ten days of the month. Stock are generally in excellent condition and will be in prime condition for October and November markets. Recent sales of calves have been made at ten cents per pound which netted the cooperators about $24.50 for five and six months old calves.

Natural Revegation

Most of the month of September has been spent on charting quadrats with 180 completed to date and approximately 50 remaining to be covered, the latter representing our clipping and volume production projects. Present indications, based on ocular estimates, are that an appreciable increase in forage density has occurred during the past year.

An interesting forage production study was made between two of the pastures, one of which had been over-utilized during the past two years as compared to conservative use in the other one. Fifty quadrats were laid out, along each side of the fence

dividing the pastures, and all the vegetation from them clipped. A division was made between the more valuable and less valuable species, from a forage viewpoint, and the tentative results (based on green weights) show that approximately 25 per cent more of the valuable species was produced on the conservatively grazed area. The less valuable species seemed to be from 10 to 15 per cent greater on the heavily grazed area. Additional volume studies will shortly be completed through which it is hoped to arrive at an approximation of the variation in volume production on areas that have been protected for varying lengths of time.

On September 18 a trip was made with Messrs. Parker and Ruelas, to the San Rafael ranch for the purpose of securing some new bulls for the Reserve herds. Unfortunately other arrangements had just been made for disposing of the bulls elsewhere. Particular attention was paid to the condition of the range enroute. Forage appears abundant everywhere on the east and south slopes of the Santa Rita Mountains and general opinion indicates that it has been six or seven years since it was anywhere near as good.

Visitors

On September 2nd and 3rd, Mr. Clapp stopped over in Tuscon for the purpose of going over our past years work as well as our plans for the coming year.

On September 5th and 6th, Messrs. R. R. Staples and A. E. Romyn from South Africa visited the Reserve and spent considerable time in the field going over our project work. Mr. Staples was particularly interested in our problems and the methods we were using to solve them.

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SANTA RITA (Oct.)

Range and Stock Conditions

Range is in excellent condition with all forage species reaching maturity during the early part of the month, although considerable green growth was in evidence on parts of the Mesa Type up to the end of the month. Field studies during the

the month have revealed a noticeable absence of weed growth this summer as compared to the average year. Protected plots in particular are conspicuous by being almost entirely free of weeds, while in past years they have supported a very much more abundant stand than the adjacent grazed ranges. Growth conditions in general for the past summer indicate that we still have a great deal to learn about the influence of amount and seasonal distribution of rainfall upon the growth of various species of vegetation. Stock are in excellent shape for fall delivery and several of the cooperators are gathering old cows and calves for delivery early in November.

Water Development

The past season has, more than ever, shown the value of adequate permanent water development on the range. With the exception of the Box Canyon supply there has not been a shortage of water anywhere on the Reserve despite the fact that the underground supply has received very little replenishment since the summer of 1923.

Natural Revegetation

The quadrat season was brought to a close on October 17 with the charting of the clipping and volume study quadrats at Forest and Road Stations. This raised our total to approximately two hundred and thirty quadrats for the summer. Compilation of the sheets shows a very decided increase in density over last year and indicates a condition not far below the high point of 1919.

Visitors

Inspector of Grazing R. R. Hill arrived in Tucson on the 2nd and remained until the 24th going over the investigative data of the station. He also made several field trips over the Reserve during the period.

Director G. A. Pearson, of the Southwestern Experiment Station visited Tucson on the 2nd and spent a day going over the Reserve and discussing the work together with future plans.

On the 9th the following visitors spent the day visiting the various enclosures on the Reserve and discussing plans for future work:- Dr. F. E. Clements of the Carnegie Institution, Dr. W. P. Taylor of the Biological Survey, Dean J. J. Thornber, Professor W. G. McGinnies and Dr. C. T. Vorhies of the University of Arizona, Dr. F. J. Crider of the Boyce-Thompson Arboretum, Dr. B. C. Tharp of the University of Texas, and Inspector of Grazing R. R. Hill.

Dr. Clements was particularly interested in the establishment of an isolation transect in the foothill type of range and considerable time was devoted to the selection of a site for this. It seems unlikely that the transect will be put in for several years due to the expense involved as well as the shortage of personnel to properly conduct a study of this nature.

Inspector of Grazing W. R. Chapline arrived in Tucson on the 14th and spent ten days discussing the Santa Rita work and plans and in making a field trip over the Reserve for the purpose of checking up conditions in general.

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GREAT BASIN

Field activities at the Great Basin Experiment Station ended with the return of the permanent force, consisting of Director C. L. Forsling, E. W. Nelson and W. E. Mann, to the office in Ogden on October 24.

The season of 1927 has been marked by good progress in a number of ways. Decided headway was made in most of the investigative projects. Some heavy rain storms during the summer further emphasized the value of herbaceous vegetation in checking surface runoff and erosion and the importance of much vegetation in watershed protection. The study of forage utilization is beginning to yield some results and has reached a point where standard methods of determining utilization are being worked out. Some preliminary investigations in soils shows this factor to play such an important part in plant succession and range improvement that much more attention must be paid to it than in the past. In other words we must look beneath as well as above the surface of the ground for the solution of the range management problem. More definite information on animal life, especially rodents, indicate more than ever the tremendous effect of the biotic factors in forage management.

Cooperation with administration in the Forest Service, with other Bureaus of the Department and other outside agencies was carried further than ever before. A meeting of the Idaho Forest Supervisors was held at the Station early in July. Training assignments of two weeks to a month were filled by two range examiners, one Forest Supervisor, two Assistant Supervisors, one Ranger, Dr. Stewart of the Utah Agricultural College, and Mr. O. S. Murie of the Biological Survey, assigned to a study of the Jackson Hole Elk. A cooperative project with Dr. J. A. Harris of the University of Minnesota was carried further by the assignment of three of his men to the Station for a part of the summer. Cooperation work in soil bacteriology was started with the Brigham Young University. Cooperation was had with the Rodent Control Office of the Biological Survey in the extermination of pocket gophers, ground squirrels, porcupines, and rabbits.

More than 250 people visited and saw the work of the Station during the summer and fully that many more called to "see the station." Included were the visitors at the 3rd biennial field day, the biggest and best field day held to date. The field days have been effective in making known the existence of such a thing as the Great Basin Experiment Station.

The next big job is the compilation of the season's data, which will begin immediately. This is a bigger undertaking than the regular station force can handle during the winter, and it is expected that some additional help will be obtained for this during the winter.

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